

DOCUMENT RESUME

ED 140 842

IR 004 950

TITLE Abstracts of Papers Presented at the April 1977
Convention of the Association for Educational
Communications and Technology, Research & Theory
Division.

INSTITUTION Syracuse Univ., N.Y. ERIC Clearinghouse on
Information Resources.

EUB DATE Apr 77

NOTE 29p.

EDRS PRICE MF-\$0.83 HC-\$2.06 Plus Postage.

DESCRIPTORS *Abstracts; Communications; Conference Reports;
*Educational Research; Educational Technology;
Research Reviews (Publications)

IDENTIFIERS *Association Educational Communications Technology

ABSTRACT

The 25 abstracts in this collection were prepared for the Research Papers Presentations at the April 1977 Association of Educational Communications and Technology Convention in Miami Beach. The abstracts are organized alphabetically by author, and most contain information about the purpose, methodology, results, and conclusions of the research study abstracted. (ST5)

* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *

ED140842



ERIC Clearinghouse on
Information Resources
Syracuse University
School of Education
Syracuse, N. Y. 13210
(315) 423-3640

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRO-
DUCED EXACTLY AS RECEIVED FROM
THE PERSON OR ORGANIZATION ORIGIN-
ATING IT. POINTS OF VIEW OR OPINIONS
STATED DO NOT NECESSARILY REPRESENT
OFFICIAL NATIONAL INSTITUTE OF
EDUCATION POSITION OR POLICY

ABSTRACTS OF PAPERS PRESENTED AT THE APRIL 1977 CONVENTION
OF THE ASSOCIATION FOR EDUCATIONAL COMMUNICATIONS &
TECHNOLOGY, RESEARCH & THEORY DIVISION

The ERIC Clearinghouse on Information Resources at Syracuse University is pleased to offer these abstracts of the research presentations from the 1977 Miami Beach Convention to the members of the Research & Theory Division.

This service to the profession affirms our continuing interest in providing research information by placing appropriate studies in the ERIC data base for other researchers to use.

We encourage you to submit your research to ERIC/IR for possible placement into the system.

Donald P. Ely
Director
ERIC/IR

These abstracts were prepared for the Research Paper Presentations at the 1977 AECT Convention in Miami Beach in April and reproduced for distribution by the ERIC Clearinghouse on Information Resources, Syracuse University, Syracuse, New York 13210.

IR0004950

RESEARCH ABSTRACTS

1977

1. Ausburn, Lynna J. and Floyd B. Ausburn. "A Supplantation Model for Instructional Design: A Preliminary Investigation."
2. Aversa, Frances M., Laurence A. Brown, Jr., and David C. Forman. "Research on Formative Evaluation: A Comparison of Three Methods of Evaluating Television Programs."
3. Berry, Louis H. "The Effects of Color Realism on Pictorial Recognition Memory."
4. Brown, Laurence A., David C. Forman, and Frances M. Aversa. "Evaluation of Open Learning Course Involving Television: Findings and Recommendations."
5. Butler, Patricia A. "Developmental Aspects of Cognitive Controls Reflected in a Visual Perceptual Task."
6. Clark, Francis E. and Dennis E. Sheriff. "A Factor Analytic Study of Hill's Cognitive Style Inventory."
7. Chen, Thomas Yih-Wen. "The Physical, Psychological, and Instructional Aspects of Color."
8. Debes, John L., III. "A Confusion of Hemispheric Proportions: New Facts for Teachers and Testers."
9. Fork, Donald J. and David H. Jonassen. "Toward a Theory of Visual Learning: A Taxonomic Approach."
10. Giffel, Terry C. "An Examination of the Effects of Learner Choice of Instructional Mode on the Attitude and Ability to Apply the Learned Information by Adults."
11. Green, Edward E. "Memory Recognition of Pictorial Stimuli Among Nursery School Children: An Exploratory Study."
12. Haygood, Robert C., Vernon S. Gerlach, and Dianne L. Wigand. "Towards a Behavioral Definition of the Behavioral Objective."
13. Head, J. Thomas. "Imaginal and Verbal Learning Strategies and Meaningful Verbal Learning."
14. Hlynka, Denis. "What Goes into a Learning Package: An Analysis of the Separate and Interactive Effects of Performance Objectives and Adjunctive Practice Questions on Learning and Attitude."
15. Holliday, William G. and Peter M. Thursby. "Teaching Visual Concepts in the Classroom."
16. Keller, Paul F. G. "Recognition Memory for Pictures in a Rapidly Changing Array under Differentiated Display Conditions."
17. Levie, W. Howard. "Pictorial Research in 1976."
18. Levie, W. Howard and David Rybat. "Research on Pictorial Materials in Cross-Cultural Communication."
19. Levie, W. Howard and Hal H. Whelpley. "Why Are Pictures Remembered Better Than Words? A Re-examination of the Incidental-Cues Hypothesis."
20. Melrick, Robert A. and James Eubanks. "Physiological Correlates of Self-Reported Mental Images Produced by Audio Stimuli."
21. Randhawa, Bikkar S. "Visual and Verbal Information Processing: So What?"
22. Roberts, Dennis M., David Torrence, Paul Welliver, and Michael Szabo. "Reliability and Validity of a New Television Test."
23. Simonson, Michael R. and Georgeann Burch. "Media Influence on Affective Learning: A Review of the Literature."
24. Spitzer, Dean R. "Achievement Motivation and Fear of Failure in Teachers."
25. Winn, William D. and Ervin Schieman. "The Effect of the Removal of Common Meaning on the Structure of Free Associations to Black-and-White and Color Pictures."

Abstract 1

A SUPPLANTATION MODEL FOR INSTRUCTIONAL DESIGN: A PRELIMINARY INVESTIGATION

Lynna J. Ausburn, Ph.D.
Education Unit
Swinburne College of Technology
Melbourne, Australia

and

Floyd B. Ausburn
Faculty of Education
Monash University
Melbourne, Australia

Purpose

The purpose of this research has been to develop a simple model which illustrates principal variables influencing the performance outcome in a learning situation, the relationships among them, and a basis on which a successful instructional treatment might be selected or devised. The model is intended to serve as a basis for instructional design.

Rationale

Instructional design is all too frequently a matter of the application of "folk art," without control or foundation in sound predictive theory. It is believed by the authors that this situation is not likely to improve substantially until a body of theory is developed which allows for predictable performance outcomes when instructional treatments are applied under specific sets of conditions. Only when the results of instructional design are predictable in terms of learning performance outcome will instructional design be able to make any claim to behavioral science status. This paper represents an effort to define some of the variables relevant to instructional design and to develop a model of predictable outcome of instructional treatment.

Control and predictability of outcome are usually based on specificity of variables involved and on the understanding of processes underlying obtained outcomes. These elements are therefore emphasized in the instructional design model proposed in this paper.

Procedures for Developing the Model and a Brief Explanation of It

Numerous variables relevant to the instructional process were reviewed. Three variables appeared to the authors to be most significant in predicting performance outcome. These three variables were (1) individual learner characteristics, (2) specific requirements of the learning task, and (3) the instructional treatment employed. Although it can be argued that other variables are sometimes important, these three appear to be of the greatest significance in the design of instruction and to be most generalizable in terms of their interrelationships. They were therefore selected as the basis for the model proposed in this paper.

After the three crucial elements were selected, they were incorporated into a model for instructional design. This model, which is fully explained in the paper, represents an attempt to illustrate the variables' interrelationships and the process which leads to a predictable performance outcome. The model is based on the underlying principle of supplantation, or performing for a learner that which he has difficulty performing for himself. The model posits the theory that both learning tasks and learners have quite specific characteristics: i.e., specific functions which must be performed, and characteristics which influence the ability to perform these functions. It is vital that these sets of requirements and characteristics be accurately and specifically identified. Once identified, they can serve as the basis for instructional design. It is further posited that a "corridor" or "link"

between task requirements and learner ability to perform them must be built before successful performance can accrue. When this link is incomplete, performance cannot be predicted because the learner may be unable to perform required task functions. The link can be actually completed, or merely strengthened, as needed, by designing instruction so as to perform for learners - to supplant - the required task functions. Depending on the requirements of the learning task and the characteristics of specific learners, varying amounts and types of supplantation may be necessary or desirable in order to produce predictable performance. Sometimes a mere prompt or cue may be all that is necessary to complete the link between task and learner. At other times, when considerable discrepancy exists between learner abilities and task requirements, the supplantation must be much more powerful, and the instructional treatment must build a considerable bridging mechanism to fill a large gap in the link. In some cases, the supplantation can be achieved by designing instruction which capitalizes on modalities preferred by learners ("conciliatory design"). In other cases, appropriate supplantation can be based on assisting learners to perform in modalities very difficult for them but demanded by given tasks ("compensatory design"). When the link between learner capabilities and task requirements has been completed by designing instruction which provides appropriate supplantation, performance outcome is predictable, since the requirements for dealing successfully with the task have been built into the instructional treatment.

In addition to instructional design, the model may have implications for A.T.I. research. Learners with differing characteristics and abilities are able to respond to differing degrees to learning tasks with specific requirements. A key to locating meaningful aptitude-treatment interactions may lie in a supplantation model of treatment design.

Once the supplantation model was developed, an attempt was made to test it by applying it to numerous studies involving instructional design and treatment problems to see if the results obtained could be interpreted within its terms of reference.

Results

The results of studies analyzed in terms of the proposed model appeared to be adequately predicted and interpreted by its application. The success of a study by the authors based on hypotheses generated from the model also support it. Predicted performances were, in fact, obtained by designing instruction on the supplantation principle after identifying relevant learner characteristics and task requirements.

Conclusions

The proposed supplantation model for instructional design, upon preliminary investigation, appears to have merit. It appears to explain appropriate research results and to generate testable hypotheses which support its predictive function.

A key to the model's application appears to be the accurate and precise identification of the specific learner characteristics and task requirements relevant to a given learning situation. Only when this is accomplished can instructional treatment which provides appropriate supplantation be designed.

This research has merely laid initial foundation support for the proposed model. The model's usefulness must now be established or rejected through its repeated testing and application. Only if it continues to provide predictable outcomes will it be a useful tool for instructional design.

Abstract 2

RESEARCH ON FORMATIVE EVALUATION: A COMPARISON OF THREE METHODS OF EVALUATING TELEVISION PROGRAMS

Frances M. Aversa
Research Associate
University of Mid-America
Box 82006
Lincoln, NB 68501

Laurence A. Brown, Jr.
Research Associate
University of Mid-America
Box 82006
Lincoln, NB 68501

David C. Forman
Research Associate
University of Mid-America
Box 82006
Lincoln, NB 68501

General Description

This study will take a television program in three stages of development -- script, rough cut* and final product -- and compare the cognitive and attitudinal responses of reviewers of the program in each of these stages. The study is designed to answer questions such as the following: how similar or dissimilar are reactions from the reader of the script, viewer of a rough cut program and viewer of the final program? On what features of the program is there consensus regardless of the stage of completion or mode of delivery? On what features is there lack of consensus? How do the learning outcomes differ from one stage to the other? How do cognitive and affective outcomes interact and does this interactive relationship vary from stage to stage?

Rationale

Many agencies are involved in the development and production of costly educational television programming. Because of the expense of making adjustments in finished television programs, there is an increasing emphasis on the continuous evaluation of the evolving product. There is frequently controversy, however, as to the value of implementing changes on the basis of criticism of the various features of a television program before it is in its final form.

This study is an attempt to begin to establish an empirical basis for the different stages of review. It also hopes to begin determining the quantity and quality of the information we can expect to learn about the comprehensibility and appeal of a program at each stage of its completion. Finally, the results of this research study are intended to enable people engaged in the formative evaluation of television programs to determine more clearly the validity of some of their evaluation procedures and to assign evaluation questions to specific stages on a more systematic basis.

Procedure

One hundred people in each of three locations will be randomly assigned to one of three groups of reviewers. One group of 33 persons in each location will read the script of a television program; a second group will view the rough cut and a third will see the finished program. The script, rough cut and final program will be identical in content though different in form.

At the beginning of the evaluation session, a standard set of pre-recorded instructions will be played for each group and an objective-referenced test will be administered as a pre-test of knowledge, interpretation and application. Following the test, a one half-hour period will be devoted to the presentation of the material. At the conclusion of the presentation, a cognitive post-test and a questionnaire on opinion and attitudes toward the presentation will be administered.

*An approximation of the final program, it is a videocassette of a working copy and may have editing marks on the film. The sound has not been mixed, some sequences may be left out, and transitions are rough.

In the experimental design, the three locations will be configured as levels of the three treatments; the dependent variables will consist of total and sub-test scores of the cognitive post-test measure, and opinion and attitude scores; the independent variables will be the ages, prior educational levels, and cognitive pre-test total and sub-test scores. Multivariate analysis of variance and covariance will be used to test the effects of the three treatments on the cognitive post-test scores and presentation appeal as revealed by the opinion and attitude questionnaire, and to delineate the relationship among the dependent and independent variables both in and among the three treatments.

Abstract 3

THE EFFECTS OF COLOR REALISM ON PICTORIAL RECOGNITION MEMORY

Louis H. Berry
Assistant Professor of Education
Program in Educational Communications and Technology
University of Pittsburgh
Pittsburgh, PA 15260

Purpose

The purpose of this study was to assess the relative effects of various color and non-color cueing techniques on Pictorial Recognition Memory. Both immediate and delayed retention effects were examined.

Rationale

An ongoing controversy exists with regard to the role of realism in visual materials. One theoretical orientation suggests that the more realistic an instructional device, the more effectively it will facilitate instruction. A conflicting group of theorists describe the human information processing system as being of limited capacity; which, in times of high information input may become overloaded and possibly block a portion of the information.

In studies related to the use of color in visual materials, similar conflicting results have been reported. As a result, few guidelines have been forthcoming relative to the use of color in visualized material for instruction.

Recognition memory, especially the recognition of pictures, represents a very basic form of learning. Numerous researchers have investigated various aspects of this type of learning in an attempt to describe the mechanisms by which pictures are processed. Little research has, however, been focused on specific attributes or design factors inherent in visuals which facilitate this process.

It was the primary purpose of this study to assess the role which color plays in the acquisition and retention of visual stimuli. Variations in color realism would seem to provide a means whereby the true function of color as a memory cue could be explored.

Procedures

The stimulus materials used in this study consisted of 140 2x2 slides of scenic views obtained from amateur photographers. One-third of this group was produced in

realistic color, one-third in black and white and one-third in non-realistic color (by means of photographic reversal). An additional pool of distractor visuals was also prepared in a similar manner.

The data for this study were obtained from 28 college students enrolled in the basic Educational Communications course at the University of Pittsburgh.

The "list learning" procedure was used in this study. Each S was first shown the group of 140 stimulus slides for short intervals (.5 sec. each). Immediately thereafter, the S was shown the stimulus visuals and distractor visuals which were combined in a random sequence. Each visual was displayed for 5 seconds. During this second or recognition session, S's were asked to indicate if they had seen the visual in the original set of 140 slides. The recognition session was repeated again after a period of two weeks.

Statistical analysis was conducted by the use of analysis of variance procedures applied to a treatment by subjects design. When significant F-values ($p < .05$) were found, a modified LSD procedure was used on all pair-wise comparisons.

Results

Significant F-ratios were produced in both immediate and delayed analyses ($p < .01$). Multiple comparisons of means indicated that both color treatments were superior to the black and white treatment on delayed recognition data.

Conclusions

Based on statistical analysis, a number of conclusions are apparent.

With regard to immediate recognition of visual materials; the data support the contention that learning becomes more complete as the overall number of available cues is increased. The nature of the cue, realistic or non-realistic, does not appear to be a significant factor.

In cases of longer term retention of information, the number of cues does not appear to be as significant a factor as the nature of the cue. In this case, the non-realistic cues may be superior because of their uniqueness or distinctiveness.

Abstract 4

EVALUATION OF OPEN LEARNING COURSE INVOLVING TELEVISION: FINDINGS AND RECOMMENDATION

Laurence A. Brown
Research Associate
University of Mid-America
P.O. Box 82006
Lincoln, NB 68501

David C. Forman
Research Associate
University of Mid-America
P.O. Box 82006
Lincoln, NB 68501

Frances M. Aversa
Research Associate
University of Mid-America
P.O. Box 82006
Lincoln, NB 68501

This paper addresses two major subjects: the role of television in open learning courses, and audiences for open learning television courses. The questions of television roles and audiences interact and are closely related. For example, television perhaps should have different functions for the enrolled and non-enrolled student. At the University of Mid-America (UMA) the questions of the roles of television and audience for television courses are two of the most crucial issues faced in instructional development evaluation and research activities. In this paper we will discuss these issues

and present some findings from our research efforts.

The paper presents a typology of the various roles that television can play in an educational setting. It does not attempt to attach relative weight or priority to these roles or to address the question of when television should be selected over other media for an educational task. The typology, instead, presents a framework for the analysis of the different effects and roles of television. It has been derived from the University of Mid-America's experience with educational television programs for adults.

The typology will be divided into cognitive, affective, skills and behaviors, student support and administrative categories. Within each of these categories, a number of sub-categories or roles will be specified. For example, under student support, the role of television in pacing the student, insuring course completion and providing psychological support will be discussed. Each role will be described in some detail, including an example taken from research or evaluation data from UMA or other open learning programs. These examples are intended to be illustrative of the type of questions being asked about the function and purpose of television in educational materials.

Applications of the typology will then be presented. The use of the typology in research and evaluation will be examined. Its potential use in media selection and instructional design decisions will also be discussed.

The second part of this paper deals with the audience for adult, open learning courses. At first, the University of Mid-America maintained a rather static view relative to open learning course audiences. The targeted audience for a course was seen as consisting of those who enroll for college credit. All others "participating" in the course through watching TV (or using other mass media components) were considered as a real but largely unknown and, therefore, unavailing audience.

Gradually a different view of open learning audiences began to emerge at UMA; this view is based on a developing understanding of open learning in general. In essence, we now consider the enrolled audience as only the top of the iceberg of adults attending to the course. The total open learning audience for UMA courses is seen as including a spectrum of audience sub-groups extending from a truly "casual" audience (those who watch TV programs or read course newspaper articles solely for personal enjoyment) through those who systematically take all the instruction they can get without enrolling to those who enroll regularly enroute to the accomplishment of set educational goals. More importantly, UMA has come to accept a dynamic view of this spectrum of audiences; that is, it is recognized that becoming an enrolled and committed on-going learner may, typically, involve many intermediate steps.

This paper will present a continuum for the analysis of the various audiences of open learning courses. It will also present data that documents the size of UMA's efforts to reach this audience.

Abstract 5

DEVELOPMENTAL ASPECTS OF COGNITIVE CONTROLS REFLECTED IN A VISUAL PERCEPTUAL TASK

Patricia A. Butler
Assistant Professor, Medical Library Science
University of Oklahoma Health Sciences Center
2320 Barclay Rd.
Oklahoma City, OK 73120

The present study is based in part upon a developmental model proposed by S. Santostefano (1969) in which the cognitive control field independence (the ability to extract an item from the field in which it appears) - field dependence (the inability to selectively deploy attention to an item within a field) pre-dates and pre-determines leveling (the tendency to minimize differences between figure and ground) or sharpening (the tendency to maximize differences between figure and ground). Research carried out independently (Santostefano, 1964; Witkin, et al, 1954) has indicated that both these cognitive controls (field independence and leveling-sharpening) develop dramatically between ages 10 and 13. As a group, children become more field independent and sharpening as they approach age 13.

Previous research (Holzman, 1952) indicates that leveling-sharpening determines in part one's ability to perceive small differences in successively displayed light intensities. Deviations from accurate judgment were measured in time-error units. The present study suggests that field dependence-field independence is also a factor in visual time-error, on the theoretical rationale that the visual stimuli, after the moment of perception, become embedded in a configuration of memory traces. Consequently, field independent persons should experience less difficulty in extricating a trace from its context. Essentially, this study asks what are the relative contributions of age, field independence-field dependence, and leveling-sharpening to assimilation tendencies in visual time-error.

Field dependence-field independence was measured by the Group Embedded Figures Test; leveling-sharpening was measured by S. Santostefano's Leveling Sharpening House Test, which is individually administered.

Eighty girls in the Norman, Oklahoma, Public School System were tested (40 ten year olds and 40 thirteen year olds). Gender was held constant because a gender-related pattern has been found: girls tend to be more field dependent and leveling than boys. The visual-time-error test was conducted with a rear-screen projection device, from which different light intensities ranging from 3.3 to 9.8 footcandles were projected in 35 successive pairs, interspersed by a dim background light of 3 footcandles, replicating a visual time-error experiment done by P. Holzman (1952). In each case, the S was to determine if the second light was brighter or dimmer than the first one.

Several multiple regressions were run to ultimately test a proposed path analysis of multiple determinants of time-error: one multiple regression to determine the relative contribution of age and field independence-field dependence to leveling-sharpening; another to determine the direct contribution of leveling-sharpening and field independence-field dependence to time-error; and another to determine the indirect effect of age on time-error, as mediated by field independence-field dependence and leveling-sharpening; and the indirect effect of field independence-field dependence on time-error, as mediated by leveling-sharpening.

Abstract 6

A FACTOR ANALYTIC STUDY OF HILL'S COGNITIVE STYLE INVENTORY

Francis E. Clark
Director of Educational Technology
Texas A&M University
College Station, TX 77840

and

Dennis E. Sheriff
Instructor in Educational Technology
Texas A&M University
College Station, TX 77840

Purpose

While it is beyond the scope of this study to question the conceptual framework of the Educational Sciences, the factor structure (derived or hypothetical attributes) of the instrument used to assess Educational Cognitive Style is, in fact, questioned. Thus, the primary purpose of this study was to identify and delineate those factors present within the area of measurement of the Cognitive Style Inventory.

Methodology

The sample consisted of 4,437 randomly selected students enrolled at a metropolitan community college whose total population was 48,773 for the three academic years 1973-74 through 1975-76. The random sample was composed of 64 per cent male and 36 per cent female students ranging in age from eight people 16 or under to ten people 60 or over. Other demographic data included six ethnic classifications, night versus day students, full-time versus part-time, first year versus second year students, and high school graduates versus non-graduates.

Data collection instruments included a demographic questionnaire (paper and pencil) and Hill's Cognitive Style Inventory (computer administered). The 4,437 students responded (Usually, Sometimes, or Rarely) to eight items per attribute (27 attributes; 216 items) on the Cognitive Style Inventory.

Preceding the identification and delineation of factors, an in-depth analysis of the descriptive characteristics of each of the 27 attributes was undertaken. From this analysis, each attribute was considered to be normally distributed throughout the 4,437 cases under investigation.

An SPSS computer program was utilized to derive the correlation matrix which described the variance within, between, and among the 27 attributes. From this correlation matrix, factors were extracted according to the alpha factor analysis technique which is based upon the psychometric concept of "generalizability." Using an orthogonal rotation technique, factors with eigenvalues greater than 1.0 were rotated to delineate those attributes present within each factor.

Results

Analysis of data yielded five factors with eigenvalues greater than 1.0, which collectively accounted for 53.6 per cent of the total common variance within the correlation matrix. All 27 attributes were present in one or more of the five identified factors. Four attributes loaded significantly (significance was interpreted as .40 or greater) on more than one factor. In an effort to eliminate biasing and synonyms, the factors were not named.

Factor 1 accounted for 31.7 per cent of the total common variance with 15 significant attributes. Accounting for 6.3 per cent of the total common variance, Factor 2 had four attributes with significant factor loadings. Factor 3 accounted for 6.0 per cent of the total common variance with seven significant attributes. Two attributes had significant loadings on Factor 4, which accounted for 5.3 per cent of the total common variance. Factor 5 was bipolar (both positive and negative significant loadings) and accounted for 4.2 per cent of the total common variance with three significant attributes.

Conclusions

Theoretically, if the Cognitive Style Inventory were factorially "pure," it would have measured 27 discrete attributes resulting in 27 factors. Until other empirical research evidence is obtained that contradict the results of this study, it can be concluded that the original 27 attribute inventory is a less efficient measure of Educational Cognitive Style than the new five attribute inventory derived from this study. However, since each of the five new attributes is factorially complex (contain more than one factor per attribute), the descriptive and diagnostic features

of the instrument are questionable in either form. Since a desideratum of scientific investigation is to have "pure" measures, it was concluded that the eight questions used to assess each of the 27 attributes will have to be reconstructed before one can speculate, with confidence, Educational Cognitive Style.

Abstract 7

THE PHYSICAL, PSYCHOLOGICAL, AND INSTRUCTIONAL ASPECTS OF COLOR

Thomas Yih-Wen Chen
Professor of Mass Communications
Audio-Visual Education
Norfolk State College
2401 Corprew Avenue
Norfolk, VA 23504

The effect of color on perception has been studied at various perceptual levels: simple visual discrimination, visual recognition, and comprehension of the content of pictorial materials. Although different experimental methods have been used in these studies, they have one objective in common -- to measure how much information can colored materials provide as compared with their black-and-white counterparts.

Simple Visual Discrimination

In order to investigate the effect of color on simple visual discrimination, it is necessary to identify the three physical properties of color: hue, brightness, and saturation. Thus, the effect of color on simple visual discrimination means the total amount of visual information, measured in terms of perception, provided by the sum of hue contrast, brightness contrast, and saturation contrast between a target and its background. The results of experiments on simple visual discrimination generally support that the brightness contrast between a target and its background is the most important cue for visual discrimination. The hue contrast also contributes to visual discrimination, but not as effectively as the brightness contrast does; while the saturation contrast probably does not contribute to visual discrimination at all.

Visual Recognition

Since recognition of visual stimuli is based on visual discrimination of the stimuli, the results of studies on the former generally coincide with those of the latter; that is, subjects depend more importantly on the brightness contrast in visual stimuli, but not on the hue contrast, for recognizing and subsequently recalling the stimuli. Since there is usually enough brightness contrast in visual stimuli, adding color in the stimuli is considered redundant.

Comprehension of the Content of Colored Materials

Although there are evidences in favor of color as an effective cue for the comprehension and retention of the content of pictorial materials, the general conclusion is that color, despite its added realism to the pictorial content, does not significantly increase the amount of information in instructional materials.

The Psychological Effect of Color

Color is known to affect the perception of apparent size and weight of objects; color arouses certain emotional responses; color attracts attention of the learner to

certain aspects of instructional materials in an otherwise dull learning environment; more importantly, the learner generally prefers colored materials. This indirect, psychological effect of color on perception and learning is, however, hardly measurable by using the same method which has been used for measuring the amount of factual information provided by colored materials.

Abstract 8

A CONFUSION OF HEMISPHERIC PROPORTIONS: NEW FACTS FOR TEACHERS AND TESTERS

John L. Debes, III
Coordinator, Governmental and Educational Market Services
Eastman Kodak Company, 343 State Street
Rochester, New York 14650

Evidence recently received from Japan casts doubt over the conclusions reached by many western world researchers about where languaging competencies are lateralized in the human brain and the extent to which they are lateralized. In fact, this very Western world evidence of lateralization when reviewed carefully is compatible with a rather different set of hypotheses than those upon which our school and our concepts of learning are generally based.

In this presentation three kinds of recently acquired evidence are compared: Conclusions reached by Japanese neurophysiologists concerning special tests administered to aphasics; reports of conclusions reached by a Japanese audiologist utilizing dichotic listening; and data, as yet unpublished, of extensive testing that indicates when and to what extent children in the U.S. begin to lateralize. All three kinds of evidence are consistent with the conclusion that Japanese lateralize differently if they are in Japanese culture than if they are in western culture, and that children in the U.S. lateralize languaging competencies in the ways reported because of factors in our culture.

By converting such evidence to visual models we can compare or contrast evidence and hypotheses. A conclusion that lateralization is far more a product of culture than it is genetics (although both factors contribute) seems justified.

Implicit in all of this is a new model for languaging that offers far higher achievements for our students than those to which we currently aspire. But neurophysiological research is needed to confirm the new paradigm of languaging and lateralization and educational research is needed to delineate the new parameters for learning achievement. The models presented may help conceptualize new hypotheses for research or new classroom procedures.

Abstract 9

TOWARD A THEORY OF VISUAL LEARNING:
A TAXONOMIC APPROACH

Donald J. Fork
Assistant Professor
Department of Educational Media
College of Education
Temple University
Philadelphia, PA 19122

and

David H. Jonassen
Assistant Professor
School of Education
22 McNutt Center
University of North Carolina
Greensboro, NC 27412

Two important functions of theory building are the organization of knowledge and generation of hypotheses. The taxonomic approach to diverse fields of research literature, as presented in this paper, has attempted to organize information about visual learning into a three stage model. The review has generated, at best, tentative conclusions that may be translated into hypotheses for visual learning research.

Visual learning is a multi-stage process including the detection and subsequent neurological transfer of visual stimuli to the visual cortex. Visual form perception as it occurs in this initial stage is controlled by certain innate, organizational (Gestalt) tendencies.

Cortical processing includes encoding into a short term iconic storage and a longer term pictorial memory. Visual memory traces are structured according to syntactic rules similar to linguistic structures.

Retrieval from pictorial memory consists of an involuntary search, the nature of which is unknown (serial, parallel) or a hypothetical form of recall (images). In the majority of humans, these functions occur predominately in the right hemisphere.

A theory of visual learning presupposes this dualistic memory system. Speculation about purely visual processes requires a separate independent visual system. The implications of visual information processing alone for a theory of visual learning are insufficient for construction of a comprehensive model. Therefore, a review of diverse educational and psychological principles related to visual processing was conducted.

The derivation of a theory or metatheory of visual learning from these suggestions and the diversified combination of theories represents a formidable task. Such a conceptual framework, built from extant theories and related research, must be constructed as a research paradigm for visual learning.

Abstract 10

AN EXAMINATION OF THE EFFECTS OF LEARNER CHOICE OF INSTRUCTIONAL MODE ON THE ATTITUDE AND ABILITY TO APPLY THE LEARNED INFORMATION BY ADULTS

Terry C. Giffel
Assistant Professor
Educational Communications & Technology
East Stroudsburg State College
East Stroudsburg, PA 18301

The purpose of this study was to examine the effect of learner choice of instructional mode on the learner's attitude toward the instructional experience and his ability to apply the learned information on an examination.

The population for this study consisted of 153 Licensed Practical Nurses and Nursing Assistants employed by the University Hospital in Madison, Wisconsin. They were involved in an inservice training activity which taught them their role in the administration of blood and/or blood components to patients.

Each participant in the study attended one of 12 two-hour instructional sessions in which the information was presented. Six sessions were randomly selected to be given a choice between self instruction and lecture while participants in the other six sessions were assigned to self instruction or lecture. Prior to the instructional

presentation, participants filled out a General Information Questionnaire and a Preferred Learning Style Index which measured each participant's preference for a receptive or discovery style of learning. After the presentation, learners completed an examination and an attitude scale.

Results of the study indicated that there was no significant difference in attitude toward the instructional experience as a result of having been assigned or given a choice of instructional mode. This writer concludes that attitudes toward the learning experience were not affected by the availability of a choice of learning mode, even if the choice of mode would have allowed the instruction to be more in line with the individual's preferences for a way of learning. The idea of involving the adult learner in decisions about how he learns, as suggested by some adult educators, may therefore not be as important as some other considerations in the teaching/learning process, or, the notion of "choice" might be so subtle and complex that this study was unable to measure the ramifications of the phenomenon.

Results also indicated that learners did not necessarily choose a mode on the basis of their preferred learning style as measured on a receptive-discovery continuum. Since those with higher expected use of the information tended to choose lecture, they might have felt they needed the opportunity to ask questions, or it may indicate that they were unwilling to risk learning something that is very important by a new technique.

On a test designed to determine if learners had acquired basic information, there was no significant difference between those who chose and those who were assigned a mode of learning. The assigned lecture group, however, did better than the other groups, but the test results were not significant at the .05 level. The difference may be due to a feeling of lesser importance about the information on the part of the choice available learners since a choice was being given about mode, or the assigned lecture group may have tried harder since they had no options. Without options, they may have felt that they had to put more effort into learning.

Analyses conducted to see if selected learner characteristics were significantly related to a learner's choice of instructional mode indicated that those who expected high use of information tended to choose lecture while those who had more experience with mediated self instruction tended to choose self instruction.

Abstract 11.

MEMORY RECOGNITION OF PICTORIAL STIMULI AMONG NURSERY SCHOOL CHILDREN: AN EXPLORATORY STUDY.

Edward E. Green
Director, Instructional Development Services
W-160 STAD
Brigham Young University
Provo, UT 84602

Introduction

The purpose of this study is to (1) propose a methodology for future audio-visual research related to short-term memory and (2) to determine some answers to the following questions:

1. What effect does graphic (cartoon vs. photographic) style of pictorial stimuli have on immediate memory recognition?
2. What effect does a variety of chromatic types of pictorial stimuli have on

- immediate memory recognition?
3. What correlation is there between three, four, and five-year levels and immediate recognition?
 4. What interactions exist among the above mentioned factors and immediate memory recognition?

The hypotheses to be tested related to each of these four questions were these:

1. Realistic drawings of some concepts enable a perceiver to recognize previously encountered pictures better than cartoon representations of the objects.
2. The presence of color elaboration of pictorial or graphic stimuli improves a person's recognition in a short-term memory task.
3. The age level of three to five-year-old children is directly related with their ability to remember pictures and attributes of pictures even though age differences are only one or two years apart.
4. Controlling the graphic encoding style and chromatic elaboration types of illustrations for particular grade levels will have an interactive effect upon their ability to remember graphic representations in short-term memory.

Materials

Thirty presentation slides representing five samples each of six treatment categories were selected from a random sample of 228 books available in the library of the nursery school at Indiana University dealing with "concepts." The six categories were: (1) cartoons, no color; (2) cartoons, some color; (3) cartoons, all color; (4) realistic, no color; (5) realistic, some color; and (6) realistic, all color.

Results

The data collected appeared to have the following significance:

1. Children in this study were not able to remember the cartoon representations more than the realistic representations. As a matter of fact, all three age levels remembered the realistic representations more than they did the cartoon representations. Significant differences were found for ages 3 and 5. Planned comparisons revealed, however, that some color slides produced a higher recognition level of cartoon than realistic styles across all three levels.
2. Although color by itself was shown to have little effect upon the child's ability to remember the graphic illustration, the presence of some color produced a lower recognition level of the cartoon than realistic styles. The largest difference between means within realistic pictures and cartoon pictures appeared at the no color level. This might suggest that realistic representations without color would have more of a facilitation effect on short-term memory than realistic representations with color. This may have significant implications for the utilization of photo-sketching techniques and other tracing techniques which result in black on white realistic representations of particular concepts.
3. As expected, the 5-year-olds were able to perform better than the 4-year-olds and the 4-year-olds performed better than the 3-year-olds. The difference between their ability to identify realistic better than cartoon representations, however, decreased with age. The 5-year-old remembered almost as many of the cartoon representations as the realistic representations, whereas the 3-year-old remembered far less cartoon representations than realistic representations.
4. The no color and all color chromatic types produced a higher recognition level of cartoon than realistic encoding style and the some color type produced a lower recognition level of cartoon than realistic styles.

Abstract 12

TOWARDS A BEHAVIORAL DEFINITION OF THE BEHAVIORAL OBJECTIVE

Robert C. Haygood
Professor
Arizona State University
Department of Psychology
Tempe, AZ 85281

Vernon S. Gerlach
Professor
Arizona State University
College of Education, Box FLS
Tempe, AZ 85281

Dianne L. Wigand
Graduate Associate
Arizona State University
College of Education
Box FLS, Tempe, AZ 85281

This study tests the hypothesis that the inclusion and the choice of a concrete direct object in a behavioral objective influence raters' perceptions of the observability of the objective. Earlier studies indicated that the verb, condition, and criterion contribute significantly to individuals' perceptions of the observability of objectives. Sixty-four subjects rated objectives which contained "X" and "Y" in place of the direct objects of objectives containing concrete direct objects. A two-way analysis of variance was performed between the objective sets and the direct objects within these sets. The results confirmed the hypothesis that the choice of a concrete direct object within an objective did influence raters' perceptions at $p \leq .01$ level of significance; however, the inclusion of a concrete direct object did not cause an overall shift in rating. The choice of a concrete direct object within an objective does influence individuals' perceptions of the observability of the objective.

Abstract 13

IMAGINAL AND VERBAL LEARNING STRATEGIES AND MEANINGFUL VERBAL LEARNING

J. Thomas Head
Assistant Director-Learning Resources Center
Virginia Polytechnic Institute and State University
Blacksburg, VA 24061

One of the major achievements of instructional technology as a process has been the development of self-paced instructional techniques. With increasing emphasis on this method of instruction, it has become more important than ever that learners adopt learning strategies appropriate to the task at hand. The purpose of this study was to determine under what conditions imaginal and verbal learning strategies interacted with the type of meaningful verbal materials being learned.

The general concept of mental imagery is of interest to instructional technologists because of the role of pictures and imaginal processes as mediators for the learning of verbal materials.

Rationale

The theoretical basis of this study is Paivio's two-process or dual-coding theory regarding verbal learning. Paivio's theory states that both imaginal and verbal symbolic processes are involved in meaningful verbal learning. The availability and effectiveness of the imaginal process is greater for concrete material than for abstract material. In contrast, the availability and effectiveness of the verbal should not be related to the concreteness of the material.

Procedures

The 55, 120 undergraduate students, were tested individually. Three groups of 40 each were given imaginal, verbal and repetitive instructions. The repetitive group wrote the phrase over and over for 15 seconds. The imaginal group actually sketched a mental picture of the phrase, and the verbal group wrote a sentence in which the phrase

was used.

In addition, Ss in the imaginal and verbal treatment groups received two types of study trial, fixed (15 sec.) and variable. The variable-time study trial allowed Ss up to 30 seconds to think of an appropriate mediator in addition to the 15 seconds allowed for producing the mediator.

Two types of recall, cued and noncued, were obtained. Half of the Ss were in the noncued condition and were asked to recall the nouns from the phrases. The other half of the Ss were in the cued condition in which adjectives from the phrases were presented as cues, and the Ss were asked to recall the appropriate nouns.

Results

An analysis of variance of the percentage of nouns recalled yielded three main effects - type of instruction, type of recall, and concreteness. The main effect of type of instructions clearly differentiated the effects of the three learning strategies. The order, imaginal > verbal > repetitive ($p < 0.01$), was as predicted. The superiority of cued recall over noncued recall ($p < 0.01$) was also a predicted result. Concrete nouns were recalled better than abstract nouns ($p < 0.01$) as predicted.

There was a significant ($p < 0.01$) two-way interaction which showed that cued recall was better than noncued recall for concrete phrases, but not for abstract phrases. However, this two-way interaction was qualified by a significant ($p < 0.01$) four-way interaction which was indicative of the complexity of the relationship between imaginal and verbal learning strategies and concreteness of the phrases, type of recall, and time of study trial.

Conclusions

The results of this study clearly showed the superiority of the imaginal learning strategy and can be explained by Paivio's two-process theory. The magnitude of the difference between recall for concrete and abstract nouns was noteworthy and provided further evidence that concreteness is the most effective variable for predicting recall of familiar words.

However, the four-way interaction provided evidence of the limited generality of the results of earlier work (Paivio and Foth, 1970; Begg, 1972).

Further extensions of this work could involve studies in classroom settings in which students were instructed to use various imaginal and verbal learning strategies for verbal material which varied in concreteness.

Abstract 14

WHAT GOES INTO A LEARNING PACKAGE:
AN ANALYSIS OF THE SEPARATE AND INTERACTIVE EFFECTS OF PERFORMANCE
OBJECTIVES AND ADJUNCTIVE PRACTICE QUESTIONS ON LEARNING AND ATTITUDE

Denis Hlynka
Associate Professor
Faculty of Education
University of Manitoba
Winnipeg, Canada

with models for designing such effective learning packages. Some of the often suggested components are: lists of performance objectives, programmed instructional materials, multi-media, pre- and post-tests, and "quest" questions for further interest. But which of these really work? And under what conditions? And in what combination?

The purpose of this study was to examine the separate and interactive effects of adding performance objectives and/or adjunctive practice questions on learning from extant instructional materials.

The two dependent variables were cognitive learning and attitude. The two independent variables were performance objectives and adjunctive practice questions.

A learning package was developed on the topic of film music. The core of the package was a collection of three articles. From these, four different packages were developed to correspond to a fully balanced 2×2 factorial design. The packages were as follows: The control package contained only the three articles. The objectives package contained the three articles plus lists of performance objectives. The adjunct package contained the three articles plus an adjunct program consisting of practice questions. The combination package contained the three articles, plus lists of performance objectives, plus adjunct practice questions.

There was a direct one to one correspondence between objectives, adjunct questions, and post-test questions.

The subjects were graduate education students enrolled in an educational media course at Michigan State University. Sample size was 76.

Six hypotheses were generated and examined. Immediate cognitive recall was examined via a researcher constructed performance test. Attitude was examined via a research constructed attitude scale.

The experiment was set up with the factors of study time and total time as covariates. When the results of a regression analysis showed that the factor of time could not predict either dependent variable, the analysis of covariance was dropped, and a two way analysis of variance was deemed to be the appropriate test.

Within the limitations of the study, analysis of the data supported the following conclusions, significant at the .05 level. (1) Student cognitive performance on extant instructional materials is improved when those students are supplied with performance objectives, assuming adjunctive questions are not present. (2) Student cognitive performance on extant instructional materials is improved when those students are supplied with an adjunctive program, assuming no objectives are present. (3) The addition of both adjunctive questions and performance objectives does not increase student learning beyond what is learned when either objectives or adjunct questions are available alone. (4) Students show a more positive attitude when the learning materials are accompanied by performance objectives. (5) The addition of adjunct questions to extant instructional materials does not result in the development of a positive attitude towards those materials. (6) In this study, study time and total time, used as covariates, were not able to explain the results. Therefore they support the hypotheses that any changes which occurred were due to the nature of the objectives and the adjunctive questions themselves.

TEACHING VISUAL CONCEPTS IN THE CLASSROOM

William G. Holliday
Associate Professor of Curriculum and Instruction
University of Calgary and
Faculty of Education
Calgary, Alberta T2N 1N4, Canada

Peter M. Thursby
Alexander MacKie College
Paddington, NSW 2021
Australia

The purpose of the present study was to examine in an a priori fashion the combined instructional effects of line drawings, photographs and textual descriptions on the learning of four visual concepts of a school-relevant nature. The chosen classroom concepts constituted the building styles of four contemporary architects. The dependent variable evaluated in this study was a simple classification task used to determine the relative extent of concept attainment. More specifically, new photographic examples not presented in the instructional treatment were presented to students for concept identification using a multiple-choice format.

Recent literature reviews by W. Howard Levie suggest that instructional pictures can facilitate concept formation when relevant cues are emphasized or are repeated under certain conditions. Furthermore, Levie concludes that realism cues most commonly contained within photographs facilitate learning provided such information is relevant to the criterion task, contrary to some interpretations of Dale's "cone of experience" picture theory.

Two hundred sixty-one tenth grade students were randomly assigned to four treatment groups and one control group. The control group (C) was presented a life-history description (placebo) of four contemporary architects. The four treatment groups were presented descriptions of these same architects' building styles. Specifically, the textual (T) group was presented four verbal descriptions (averaging about 125 words each) of each style. Second, the text-photographic (T-P) group was presented materials identical to the textual group plus two photographic examples of each style. Third, the text-line drawing (T-D) group was presented materials identical to the textual group plus two generalized line drawings of each style. Fourth, the text-line drawing-photographic (T-D-P) group was presented materials identical to the textual group plus one generalized line drawing and one photographic example of each style.

First, it was hypothesized that the combined learning effects of the text-line drawing-photographic (T-D-P) group would constitute a more effective instructional combination than the text-line drawing (T-D) combination or the text-photographic (T-P) combination. Second, it was hypothesized that these latter visual-verbal (T-D, T-P) combinations would be independently more effective than the mere text (T). Third, it was hypothesized that the text (T) treatment would be more effective than the control (C).

Thirteen black and white photographic examples of each style (totaling 52 photographs) constituted the pool from which photographic examples were randomly selected for inclusion in both photographic-related (T-P, T-D-P) treatments. Two generalized line drawings of each style constituted a separate pool from which drawings were randomly selected for inclusion in the text-line drawings-photographic (T-D-P) treatment. These drawings were generalized representations of buildings presenting dominant visual characteristics of each architect's style.

The instructional information was presented on a single 56 x 48 cm. display card. Eight instructional cards were developed for each group, totaling 40 separate displays. Each card was divided into quarters using inked lines.

Students were instructed to learn the presented material and told that a test would be administered subsequent to their study. The test required students to identify the architect most likely associated with a projected photographic example of a new building. This description of the test was announced to the students preceding the instructional phase of the experiment.

As predicted, results significantly supported the three hypotheses ($p < .05$). Future classroom studies concerning "mature" learners might evaluate such dependent variables as artists' painting styles commonly studied in art classes or geological stages of river development commonly studied in earth science classes.

Abstract 16

RECOGNITION MEMORY FOR PICTURES IN A RAPIDLY CHANGING ARRAY UNDER DIFFERENTIATED DISPLAY CONDITIONS

Paul F. G. Keller
Lecturer in Instructional Technology
College of Library and Information Services
University of Maryland
College Park, MD 20742

In an effort to begin exploration of human information processing capabilities in the visually compressed environment of the kinestasis film, a pool of ca. 500 slides of nature scenes was assembled, and 144 images were randomly chosen and numbered. An author-written computer program produced the exposure sheet for rephotographing the images on super-8 film so that display conditions would be random. The resulting kinestasis film presented 144 images in 144 seconds and was congruent with a 2x2x2 repeated measures ANOVA representing those factors: short vs. long duration, single vs. repeated image, and static vs. moving image.

Ss were 96 experimentally naive teacher education students who viewed the film and were tested immediately afterward by means of a 56-item picture recognition test representing a stratified random sample of display conditions in the film. Each item consisted of 4 images rephotographed on a single slide, one of which had been previously seen whilst the others had been taken from the pool of unused slides.

The treatment accounted for a significant proportion of the variance in criterion scores (less than 6%) while within--Ss variation accounted for almost 24%. Of the main effects, only repetition was significant, and that in the direction of single images. The effect was not, however distributed over the other factors. Both first and second order interactions were significant beyond the .05 level. The deviant cell represented the duration (short) - repetition (repeated image) - motion (moving image) display condition.

Total scores collapsed across all subjects ranged from 12 to 33 for the 56-item test. The mean score of 22.5 was significantly different from a chance guessing score beyond the 0.5 level. The retention rate was, however, much lower than those reported both in studies using larger learning sets with longer per-item durations and those using smaller learning sets at similar durations.

Abstract 17

PICTORIAL RESEARCH IN 1976

W. Howard Levie
Associate Professor
Audio-Visual Center
Indiana University
Bloomington, IN 47401

A search of prominent journals in psychology and education revealed about 250 articles published last year on issues relevant to pictorial literacy.

Pictorial Memory Models

Considerable research was devoted to testing models of how pictures are processed in human memory and to providing an explanation of the pictorial superiority effect -- the finding that pictures are generally superior to words in experimental learning tasks. Several researchers tested predictions derived from Paivio's dual-coding hypothesis in contrast to single-system models which predict only quantitative, not qualitative, performance differences. Although evidence supporting both views was reported, the trend seemed to favor the dual-coding model. Research supporting the frequency theory approach and the incidental-cues hypothesis also appeared. Adding to the confusion, conceptualizations emphasizing distinctions between sensory codes (physical/schematic information) and levels of semantic codes received empirical support. Lively debate can be expected.

Independent Variables

A range of pictorial stimulus variables such as color, motion, depth cues, and the organization of elements was studied. Subject variables included several indices of aptitude and learning ability, sex, culture, and most predominantly, age. Developmental research on interpreting, producing and learning from pictures flourished. The potential facilitation of complementary verbal material and activity was studied (e.g., captioning, labeling, verbalizing) as was the potential interference of simultaneous verbal and imaginal activity.

Dependent Variables

Standard measures of learning (recognition, free recall, paired-associate recall, reaction time) predominated. Tests of higher cognitive processes and affective reactions were rare. However, interesting variables such as clustering and temporal judgements are becoming more common as research designs increase in complexity and ingenuity.

Related Topical Areas

Research on mental imagery, while still very popular, declined somewhat from recent years. Further investigations of hemispheric asymmetries in processing verbal and non-verbal information were reported, and several researchers studied aspects of memory for human faces. Interest in iconic memory (very short term visual store), eye movements, and cross-modality research appeared to diminish.

Implications for Instruction

With the exceptions of research dealing with young children and a set of studies about text illustrations, the bulk of this research literature was directed toward theoretical problems in experimental psychology rather than toward practical problems in educational communication. Practical implications must be inferred and extrapolated. Pictorial research in education-oriented journals such as the Journal of Educational Psychology and the AERA publications was disappointingly sparse. Researchers in psychology appear to have shed their traditional bias favoring verbal learning. Will educational researchers follow?

Abstract 18

RESEARCH ON PICTORIAL MATERIALS IN CROSS-CULTURAL COMMUNICATION

W. Howard Levie
Associate Professor
Audio-Visual Center
Indiana University
Bloomington, IN 47401

and

David Rybat
Audio-Visual Center
Indiana University
Bloomington, IN 47401

"Pictures are not a universal language" is a statement heard over and over. It is true that pictures are not interpreted with equal ease by all people in all cultures. Much anecdotal evidence suggests a lack of pictorial literacy among people in remote developing areas. Stories are told of tribal Africans who prefer licking to looking at photographs and of others who perceive a closeup of a fly to be a 100 pound insect.

Early research dealing with cross-cultural differences in pictorial literacy contributed to this image. In particular, gross deficiencies in the perception of depth cues were reported. However, it has been recently observed that much of this early research was methodologically weak and probably over-estimated the true differences. Current research in the area provides a less dramatic, but more reasoned perspective. The gap between cultures seems narrower. Differences are still found, but they are smaller. Also researchers are now finding increasing numbers of instances in which there are no apparent cross-cultural differences. While research in the area is still sporadic, it is increasing in quantity, improving in quality, and broadening in scope. Even so, the few research generalizations which we offer below must be considered highly tentative:

Individuals in developing cultures are sometimes deficient in pictorial literacy. However, statements about cross-cultural differences must be modified significantly when community differences within cultures are considered.

Individuals who are totally unable to understand pictures may change suddenly once they gain the concept that a picture can represent an object. Also, pictorial literacy can be improved by relatively modest educational efforts. Instruction in interpreting pictorial conventions and techniques, such as depth cues, may result in marked improvement.

Experience with pictorial stimuli is the most important variable in determining pictorial literacy. Such experience is often correlated with formal education, age, and urbanization. Given that an individual has sufficient experience with the techniques used in a picture, comprehension will then be dependent upon familiarity with the objects or situations pictured. Ecological explanations (e.g., the "carpentered world" hypothesis) are inadequate to account for cross-cultural differences in learning from instructional illustrations.

Research on the manipulation of pictorial stimulus variables is just beginning, but indications are that the control of pictorial complexity is critical. Too much detail may lead to failures to make figure-ground discriminations. Too little detail may result in the inability to associate figures in pictures with real objects. However, subject-matter familiarity may be an intervening variable.

At present, the results of research do not warrant prescriptive advice for pictorial design. Accordingly, practitioners should be aware of the complexities of the problem and systematically pretest their messages on their intended audience.

Abstract 19

WHY ARE PICTURES REMEMBERED BETTER THAN WORDS? A RE-EXAMINATION
OF THE INCIDENTAL-CUES HYPOTHESIS

W. Howard Levie
Associate Professor
Audio-Visual Center
Indiana University
Bloomington, IN 47401

and

Hal H. Whelply
Assistant Professor
Director of Audiovisual Services
Concordia College
Seward, NB 68434

Several hypotheses have been offered to explain the repeated finding that memory for pictures is superior to memory for words in experimental learning tasks. Among these is the incidental-cues hypothesis, proposing that pictures are remembered better because they provide a rich variety of incidental, but distinctive, cues which can be stored in memory and then later retrieved. If this hypothesis is correct, it should follow that pictures that are rich in such cues should be remembered better than pictures with few cues. For example, color photographs should be remembered better than simple line drawings.

Most research based upon this line of reasoning has failed to provide supporting evidence. However, in 1976 Denis reported partial confirmation in a free recall learning experiment, suggesting that additional study is needed. Accordingly, a test of the incidental-cues hypothesis for recognition memory was conducted.

Design and Procedure

Slides representing familiar concepts (e.g., eye, shoe, chair, etc.) were produced in four modes: (1) a color photograph, (2) an identical black and white photograph, (3) a simple line drawing made from the photograph, and (4) a one-word label of the object pictured. In small groups, 25 fourth grade students and 21 eighth grade students were shown a series of slides including 12 of these concepts. Each subject was shown a concept only once in one of the four modes. Each concept was seen in each of the four modes by approximately equal numbers of students within each grade level. Presentation order was randomized and subjects were randomly assigned to treatments.

After an eight week delay, recognition memory for the concepts was tested. Subjects were shown pairs of slides, one of which was identical to the slide seen in the presentation series and one of which was a new, but similar concept in the same mode (e.g., the target word "eye" paired with the distractor word "ear" or the target color photo of an eye paired with a distractor color photo of an ear, etc.). Subjects were asked to discriminate the previously seen slide (the target) from the distractor.

Results

The data fail to provide support for the incidental-cues hypothesis. Across both grade levels recognition memory for words was inferior to all picture conditions, but there were essentially no differences in performance between the three pictorial modes. Recognition rates for the four types of stimuli were: words--64%; drawings--75%; black and white photographs--79%; and color photographs--74%. Overall, 8th graders performed better than 4th graders ($p. < .05$), particularly with color photographs ($p. < .05$).

Abstract 20

PHYSIOLOGICAL CORRELATES OF SELF-REPORTED MENTAL IMAGES
PRODUCED BY AUDIO STIMULI

Robert A. Melnick
Instructor
Arizona State University,
College of Education, Box FLS,
Tempe, AZ 85281

James Eubanks
Psychologist
Informative Image, Inc.
115 W. McDowell Rd.
Phoenix, AZ 85003

This study was conducted to determine the relationship between subjects' self-reports of the degree of vividness of mental images produced by audio (oral) stimuli and the intensity of subjects' physiological responses to the same stimuli.

The subjects were a heterogeneous sample of 20 volunteer students at Arizona State University and were paid for participating. Subjects were asked to imagine themselves performing a simple motor task and an electromyograph (EMG) was used to measure the electrical potential in the muscle group utilized in the actual performance of the task. Subjects then "reported" their estimate of the vividness of the image of performing the task.

A rank order correlation of .93 was obtained between self-reports of the vividness of an image and the measured muscle response produced by the audio stimuli. The results of the study suggest a strong relationship between imagery experience and audio (oral) stimuli.

Abstract 21

VISUAL AND VERBAL INFORMATION PROCESSING: SO WHAT?

Bikkar S. Randhawa
Professor and Coordinator, Visual Scholars Program
College of Education
University of Iowa
W-513 East Hall
Iowa City, IA 52242

Information Processing

Research studies that have compared the relative effectiveness of informationally "equivalent" visual and verbal stimuli have reported two kinds of evidence. First, verbal stimuli are superior to visual because the visual stimuli on input must be coded in the verbal form before retrieval and response. Second, visual stimuli are better than verbal for processing information because the verbal stimuli are coded in non-verbal form for storage. Therefore, retrieval and response from such a store depends on the response mode.

Our research challenged the "verbal loop" hypothesis -- the first evidential perspective. We have shown that the relative effectiveness of sensory channels is a function of the form of stimuli, stimulus complexity, form of response, structural characteristics of both the stimulus and response modalities, developmental stage, and

cognitive styles of the respondents, etc. Most of our research in information processing thus far involved tasks that were based on the information theory model and the major thrust has been theoretical. Out future work in this tradition will combine theoretical and practical concerns. In the practical realm a major research focus will be such that: our research is learner oriented; the materials are instructionally relevant; the context of research is developmental; and, where appropriate, aptitude treatment interaction is possible. Saliency of instructionally relevant cues, besides modal differentiations, could also be studied involving an information processing approach. Some preliminary strategies will be outlined in the present presentation.

A model for processing information involving various sensory mechanisms in relation to visual learning, thinking, and communication is proposed. While integrating the processing demands of several kinds through the dynamic interaction of the organism, this model will demonstrate why different perspectives are needed in dealing with instructional concerns.

Visual Testing

In spite of a tremendous growth in our production capabilities of visuals and in the use of visuals in instruction testing, procedures and practices have not changed much. Conventional tests and their content, even if pictorial in rare instances, rely very heavily on the verbal channel. Visual tests which may at times involve verbal content will be those that depend mainly on implicit or explicit imagery and operate through the visual channel. Distinctions between visual and conventional tests will be outlined and explained with examples.

Abstract 22

RELIABILITY AND VALIDITY OF A NEW TELEVISION TEST OF SCIENCE PROCESSES

Dennis M. Roberts
Associate Professor
Penn State University
418 Carpenter Building
University Park, PA 16802

David Torrence
Director of Media Services
Moravian College
Bethlehem, PA 18018

Michael Szabo, Associate Professor
201 Chambers Building
Penn State University
University Park, PA 16802

Paul Welliver
Penn State University
Associate Professor
320 Rackley Building
University Park, PA 16802

The purpose of this study was to establish initial reliability and validity data for a new Television Test of Science Processes (Torrence, 1976) as part of the Science for the Seventies project in Pennsylvania. The test (TTSP) is a series of ten fifteen-minute televised programs for the primary grades and ten twenty-minute programs for intermediate grades.

Test Development

The TTSP was adapted from Tannenbaum's Test of Science Processes (1968). The original Tannenbaum test had 96 items. The present TTSP development went through three stages. Form A consisted of 68 content valid items from Tannenbaum's original work. Television production consisted of directly videotaping visuals (stimulus cues for test items). Form B utilized pilot response time data. Form C--the final form--consisted of 40 items selected on the basis of item analysis data from the earlier pilot

work. New videotapes and auxiliary test administration procedures material were produced.

Samples

There were two samples of students used. The first was a large norming group consisting of 3480 fifth grade students drawn from 12 countries and 19 school systems. Initial reliability and norms data were gathered from this sample. A second sample of 207 fifth and sixth grade students was used for initial validation. In addition to the TTSP information being gathered in the validation group, data on several other cognitive measures were also collected.

Results

Reliability was determined by Kuder-Richardson formula 20. This reliability coefficient is a measure of internal consistency. Coefficients for the norming and validation samples were .736 and .816 respectively. The present TTSP, relative to test length, has similar reliability compared to the Tannenbaum test. Validity coefficients, i.e., correlations between TTSP and the other cognitive measures, ranged from the mid .50's to the mid .80's.

Abstract 23

MEDIA INFLUENCE ON AFFECTIVE LEARNING: A REVIEW OF THE LITERATURE

Michael R. Simonson
Assistant Professor
321 Curtiss Hall
Iowa State University
Ames, IA 50011

and

Georgeann Burch
Teaching Assistant
321 Curtiss Hall
Iowa State University
Ames, IA 50011

Purpose:

Research literature was reviewed to determine if there was sufficient experimentally produced evidence to support the assumption that the impact on learner affect of information delivered by media becomes increasingly more predictable the more realistic and the less abstract the particular medium is in delivering the content. Also evaluated during the literature review process was the general type of influence that is exerted by instructional media on the affective component of a learner's attitude in educational situations.

Procedures:

Media types were first categorized according to the abstractness of their delivery of cognitive information, then all articles published in the twenty-three volumes of AV Communication Review (AVCR) were read and identified as:

- a.) experimental or non-experimental (Campbell & Stanley, 1963)
- b.) measuring attitude
- c.) attempting attitude change

Relevant experimental studies were then reviewed in order to determine if identifiable similarities in attitude related results were obtained. Also, an annotated bibliography of relevant studies was included.

Conclusions:

Of the 567 articles published in the first twenty-three volumes of AVCR, 42% were identified as experimental, and 12% specifically included criterion measures evaluating learner attitude. It was concluded from this review of the literature that:

- researchers do not routinely evaluate the impact of mediated instruction on learner affect
- attitude measures, when used, were generally post-hoc and peripheral to the major thrust of the study
- locally produced measures, without validity or reliability data, were most often used
- learner attitude changes from instructional media have not been widely studied or attempted by media researchers.

While not conclusive, the specific data reviewed tended to support the assumption that instructional media can have an impact on liking of content, and that this impact becomes more predictable as media type becomes less abstract.

Abstract 24

ACHIEVEMENT MOTIVATION AND FEAR OF FAILURE IN TEACHERS

Dean R. Spitzer
Department of Education
University of North Carolina at Wilmington
Wilmington, NC 28401

In the area of motivation research, "achievement motivation" stands out as the only well-explicated construct. Another construct which is closely related to achievement motivation is the concept of "fear of failure," but this has not been systematically explicated. Many view the "achievement motive" and "fear of failure" as two sides of the same coin. However, most research has indicated that those high in achievement needs are low in fear of failure, and vice versa. There are usually negative correlations between these two constructs, or no significant correlation at all. In my own research, I have found some indication that teachers may possess some of the characteristics of achievement motivation and fear of failure. A correlational study of a representative group of teachers tended to support this hypothesis. This study yielded a correlation coefficient of +.76.

There are many possible ways of explaining this result. Among those that will be suggested in the presentation are: the nature of the sample compared to traditionally tested groups, the unusual nature of the testing instruments, and the possibility of confusion over the nature of the constructs in question. The most promising explanation is that there are two dimensions to most motivational constructs: need and value. In existing theory, only need is considered. It may well be that teachers value achievement, but the actual need is suppressed by fear of failure cues in achievement situations. There have also been some preliminary indications that teachers exhibit high achievement motivation in more structured situations, but tend more towards fear of failure in unstructured situations.

The implications of these hypotheses will be discussed, particularly in terms of the diffusion of innovation. If the coexistence of the achievement motive and fear of failure is replicated in future studies, it may well indicate that certain precautions may have to be taken in attempting to facilitate change in educational organizations. This area of research appears to be a seductive one. Research may throw considerable light on the psychological make-up of teachers, their needs and values, and the nature of achievement motivation itself.

Abstract 25

THE EFFECT OF THE REMOVAL OF COMMON MEANING ON THE STRUCTURE OF FREE ASSOCIATIONS TO BLACK-AND-WHITE AND COLOR PICTURES.

William D. Winn
Assistant Professor and
Department of Curriculum and Instruction,
Faculty of Education, University of Calgary,
Calgary, Alberta, Canada, T2N 1N4.

Ervin Schieman
Instructor
Department of Curriculum and Instruction,
Faculty of Education,
University of Calgary,
Calgary, Alberta, Canada T2N 1N4.

Seventy-five university undergraduates made multiple free associations to twelve color slides, and eighty-seven undergraduates made associations to black-and-white copies of the slides. Intersection coefficients for all pair combinations of the twelve slides in each set were calculated (Deese, 1962) and these were factor analyzed. Common associations made to both the color and the black-and-white slides were then removed, new intersection coefficients were calculated, and these too were factor analyzed. The color and black-and-white factor matrices obtained both before and after common associations had been removed were then compared using Joreskog's (1971) simultaneous factor analysis of several populations procedure.

It was expected that differences in the structure of the associations would occur only after the associative meaning common to both conditions had been removed. However, simultaneous factor analysis revealed no such differences. The hypothesis that it was the dominance of the "thing-character" (Heidbreder, 1946) that accounted for the lack of structural differences between associations to color and monochrome stimuli, reported by Winn (1976), was not supported. This lack of difference might be explained by the fact that subjects were perceiving color cues because there was no need for them to do so. A second experiment was carried out to study this.

Multiple free associations to color slides were obtained from three groups of subjects. The first group were given no instructions beyond normal free association instructions. The second group were told they would be asked to recall the objects in each slide. The third group were told they would be asked to recall the objects and the predominant color in each slide. A fourth group, viewing black-and-white slides and receiving only free association instructions, served as a control group.

The proportion of color adjective associations was calculated for each subject. A priori orthogonal contrasts showed that subjects receiving no recall instructions and those receiving instructions to recall both subjects and their colors made significantly more color adjective associations than the control group. Subjects told to recall objects and not colors made no more color adjective associations than those who saw black-and-white slides. The ability to recall colors was significantly better with subjects told to recall color and with those not given any recall instructions.

These data suggest that color in pictures will only become part of the meaning of the picture when subjects are made to use the information color provides. When subjects are instructed to use information other than that provided by color, color associations are no more frequent than when subjects see black-and-white pictures.